

OZONE IN POTATO STORAGES: SUBSTANCE OR SMOKE?

by

Phillip Nolte

University of Idaho Extension Seed Potato Specialist

The effectiveness of Ozone treatment of water or air for use on potatoes in storage is, to say the least, a controversial subject. There is no doubt that effective post-harvest and in-storage treatments for such diseases as silver scurf, dry rot, soft rot, late blight and others, is badly needed. All of these diseases can cause significant problems for growers in outright product losses, quality losses or both. There are only a few treatments currently labeled for use against only a few of these diseases and, in many cases, their effectiveness is either marginal, unknown, in doubt or "requires further investigation".

Why ozone? Well, in many ways, ozone has a good reputation, especially for certain uses. Ozone is a strong oxidizing agent and such materials often make for excellent disinfectants. Ozone treatment has been established as a safe, effective means of purifying drinking water, swimming pools, hot tubs etc. With this kind of track record, the intuitive leap to using ozone for treating potatoes and other produce in storage doesn't seem like an overly long stretch.

All of this would make for interesting speculation except for the fact that ozone generators are currently in place on a number of potato storages throughout the Pacific Northwest. Additional growers are pondering the purchase and use of ozone generators on their own storages. With all this activity, everybody is wondering just what the current state of knowledge regarding ozone use and effectiveness is regarding stored potatoes. Fortunately, there do not appear to be any legal concerns surrounding the use of ozone generators for this purpose.

One problem regarding the effectiveness of ozone treatments for stored potatoes is a serious and chronic lack of information. What data there is, however, looks only faintly promising. Studies performed by Dean (1993) at Washington State University on stored onions demonstrated no difference in disease levels between ozone treated and untreated checks. Similar studies by Zink in Colorado (1994) indicated no difference between ozone-treated and untreated potatoes in storage for silver scurf and early blight. Additional studies by Zink on ozone in the irrigation water for treatment of early blight and effects on yield were similarly negative.

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Studies done in cooperation between the Ozone company and our University of Idaho laboratory in Idaho Falls showed a significant reduction in silver scurf severity over the untreated control when ozone was applied at two levels on stored potatoes. There was no significant difference in lesion size. Similar trials on late blight-infected tubers showed significantly more tuber rot in tubers stored with the low rate (1ppm) of ozone when compared to untreated and high rates (2ppm). This information is interesting, even promising, but whether results obtained from these small bin experiments (approx. 6 cu ft) would translate to a 70,000 cwt. storage is unknown.

Interestingly, when the ozone-treated potatoes described above were used as seed for a summer grow out here in Idaho, the treated potatoes yielded significantly higher amounts of #1 and over 10 oz. tubers (Davis, 1996). This set of experiments will be repeated to see if these differences will show up again. If these are real differences, and they could be, we have no idea what mechanism might be involved.

The experimental data collected, so far, has been inconclusive, negative, or confusing. There are a number of questions that come to mind about the current state of the ozone industry that might explain some of the confusion. Questions such as: What is the effective concentration of ozone required for storage disease management? Can such rates be maintained in large storages? What disease organisms are controlled by ozone treatment? What is the most advantageous timing for the application? Early or late, continuous or intermittent? Keep in mind also that there is a wide range of equipment available that has different capabilities and limitations. If ozone is proved to be effective for potato storages, what about standardization or at least minimum performance requirements?

Many of you are probably wondering, "But what about all the testimonials I've seen on how well ozone works? Surely they have to count for something?" Owner / user testimonials are suggestive but, unfortunately, ultimately unreliable. This is because most testimonial information is generated without proper controls or attention to the scientific details necessary to determine the actual effectiveness of the practice. The proud owner of an ozone generator has a sizable investment and, therefore, often tends to overestimate the actual effectiveness of the machine. There's comfort in numbers and he'll feel a lot better after he sees a generator go up on the neighbor's storage.

One more item needs to be discussed and it is not a comfortable one. The ozone industry has, in my opinion, a serious reputation and identity problem. There are many hard-working, honest people in the business who are only trying to do what they feel is best for their clients. There is also, an unfortunate abundance of fringe types and other oddball elements out there who are giving the industry a bad name. Beware of extravagant claims where ozone is being given credit for curing everything from cancer to ingrown toenails! I have no solution to this problem but, make no mistake, the credibility of the legitimate ozone industry is severely compromised by such lunacy.

In summary, myself and the other researchers with whom I have recently consulted agree that we would be foolish to reject the potential of ozone technology for improving potato storage without more investigation.

Even now I would say that ozone treatment looks to be cautiously promising for some diseases, silver scurf, perhaps, the foremost among them. I would caution all involved that more work under scientific scrutiny is vital to understanding and properly utilizing ozone. Funding for legitimate research is sorely needed. Finally, as is perhaps true of any emerging technology, there is a lot of confusion and conflicting claims currently circulating. If you ask me, this ozone business could use some serious sorting out!